

WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-110280-3U

VOLUME 2 -- SERVICE MANUAL

626-PA-6011

TIME AND EVENT ACCUMULATOR

15 March 1983
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(Rev. 15 May 1987)

See opposite side relative to proprietary rights.

Note: Refer to Volume 1 (Operator's Manual) of TM-110280-3U for the installation and operation instructions.

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DRANETZ

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626-PA-6011 EVENT MONITOR

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VOLUME 2 SERVICE MANUAL

626-PA-6011 TIME AND EVENT ACCUMULATOR

SECTION IV THEORY OF OPERATION

4.1 INTRODUCTION

Volume 2 of TM-110280-3U provides the maintenance instructions for the 626-PA-6011 Time and Event Accumulator, hereinafter referred to as the 6011 plug-in. This volume is divided into three sections: (IV) THEORY OF OPERATION, (V) REPLACEABLE PARTS LIST, and (VI) SCHEMATICS AND ASSEMBLY DRAWINGS. (See Volume 1 of TM-110280-3U for the installation, operation, and operational test instructions for the 6011 plug-in.)

4.2 GENERAL FUNCTIONAL DESCRIPTION

The 626-PA-6011 Time and Event Accumulator is an 8-channel module designed to monitor the logic states of eight independent inputs and record the time spent in a given state as well as the changes of state. As shown in the block diagram of figure 4-1, the eight input channel circuits are identical. Each consists of a differential amplifier and comparator. The output of each input channel circuit is applied to a digital filter whose clock frequency is user programmable. The new state data is exclusive-OR'd with the old state data to determine whether or not a change of state has occurred. All eight outputs are then OR'd together so that an interrupt (IRQ) signal can be generated if any input changes state. The IRQ is transmitted to the processor in the main frame, provided that the IRQ gate-enabling signal is on. The gate-enabling signal inhibits the transmission of the IRQ signal if the board is deemed inoperable in the interrupt or system check routine. The IRQ signal is also turned off temporarily during the system check routine, at which time a 640 mSec signal is forced into all eight inputs and the system verifies that all inputs have indeed changed state.

4.3 DETAILED DESCRIPTION (SEE FIGURE 6-2)

Each of the eight input sections consists of a dual operational amplifier (U29) which is used both as a differential amplifier and comparator. Resistors R13 and R14 limit input current and, in combination with C3 and C4, provide filtering. The input voltage is

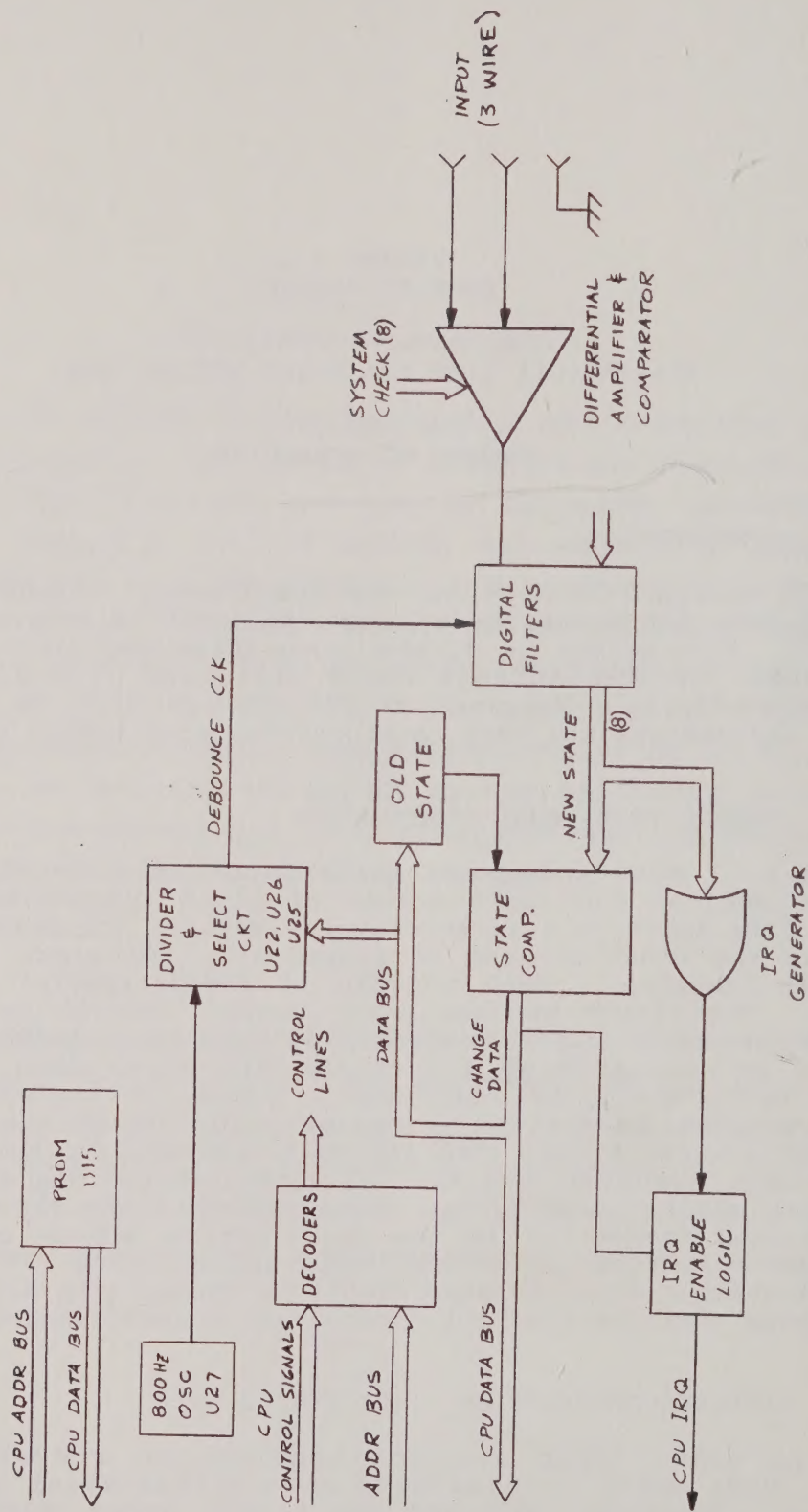


Figure 4-1. 6011 Time and Event Accumulator, Block Diagram

divided down by more than 200, allowing for a common mode voltage of $\pm 200\text{V DC}$. A 2V DC differential input produces an output signal of approximately -95 mV DC from the differential amplifier. In the comparator stage, this voltage is compared to a reference voltage of approximately -95 mV DC , as established by the resistive divider consisting of R8, potentiometer R9, and R7. The comparator output is set positive when input voltage is 2.3V DC maximum (if previously low) and is set low when input voltage is 1.8V DC minimum (if previously high). Resistor R17 establishes a minimum hysteresis of 0.1V DC . The comparator output is clamped between ground and 5V DC by R6 and zener diode CR2.

During the system check mode, switch U30 reconfigures all eight differential amplifier inputs; the non-inverted inputs are shorted to ground while a 640 mSec calibrate signal from U27-5,6,7 is fed to the inverted inputs. The outputs of all eight channels are then read in normal manner, verifying the integrity of all board components from just after the input resistors to the data bus.

Digital filters U13 and U14 receive the outputs of the input channel comparators. In order for an input signal to pass through a digital filter, it must remain in the same state for four clock cycles. Minimum validation time is user-programmable to 5, 10, 20 or 320 mSec , which correspond to 400, 200, 100 or 62.5 Hz debounce clock frequencies, respectively. Oscillator U27 provides an 800 Hz signal that is divided down by binary counter U22. The desired debounce clock is selected by quad switch U26. Switch operation is, in turn, controlled by clock latch U25.

If an input signal remains valid for the proper time, it passes through the digital filter and is compared in an exclusive-OR gate (U7,U8) to the old state, held in latches U5 and U6. The eight exclusive-OR outputs are summed by NOR gate U9, so that any detected change of state produces an interrupt signal. If pin 9 of OR gate U10 is enabled by a low level INT ENA (low level) signal from IRQ enable latch U12, then the interrupt signal (MIRQ) is transferred to the CPU bus. The IRQ state is also placed on the data bus through U11, regardless of the IRQ enable signal status.

Change data is transferred to the data bus by enabling tri-state buffers U2 and U3. Buffers U4 and part of U3 act as buffers for all data written to the module.

The CPU control signals from the mainframe are buffered to the logic control circuits by U11. Address lines A0-A2 are buffered by sections of U17. These three lines are decoded by U21 to produce the eight control/latching signals. Table 4-1 defines the address codes.

One-shot multivibrator U20 is used when writing data so that data is clocked in while it is still valid (before the next phase 2 clock edge). The RESET line clears the digital filter data when a Power-On-Reset condition occurs.

Table 4-1. Address Codes

Address	Description
X000	Read change data
X001	Read and disable IRQ
X002	Read dip switch
X003	Clear calibrate (system check) state
X004	Write (latch in) old state
X005	Enable IRQ
X006	Set debounce frequency latch
X007	Set calibrate state

SECTION V
REPLACEABLE PARTS LIST

5.1 GENERAL

The replaceable parts list identifies the replaceable parts in the 6011 plug-in. For each replaceable part, the following is presented: reference designation (if applicable), part number, manufacturer's code number, and description. Hardware is not included in this table. For information concerning the hardware, contact the Dranetz Service Corporation.

Refer to figure 6-1 for the location of the replaceable parts in the 6011 plug-in.

5.2 MANUFACTURERS CODES

The manufacturers codes referenced in the Replaceable Parts List that follows are identified below.

Man. Code	Source
23207	Dranetz Technologies, Inc. 1000 New Durham Road, P.O. Box 4019 Edison, New Jersey 08818-4019
81349	On Mil specification list. Manufactured to meet military specifications. Available from a variety of suppliers.

REPLACEABLE PARTS LIST

626-PA-6011

PC BOARD, 8 CHANNEL INPUT P/N 110280-G3

REFERENCE DESIGNATION	PART NO.	MAN. CODE NO.	DESCRIPTION
C1	104023-G2	23207	Cap, 82 pf, 500V
C2,C5-C11, C13-C17	103209-G2	23207	Cap, 0.22 uf, 100V
C3A-C3H, C4A-C4H	104020-G1	23207	Cap, 470 pf, 100V
C12	104071-G1	23207	Cap, .047 uf, 5%, 250V
CR1,CR2A-CR2H	104403-G6	23207	Diode, Zener
J1A-J1H	110741-G1	23207	Socket, Housing
R1	RN60C4991F	81349	Res, 4.99K, 1%, 1/8W
R2	RN60C3482F	81349	Res, 34.8K, 1%, 1/8W
R3	RN60C9093F	81349	Res, 909K, 1%, 1/8W
R4	RN60C9092F	81349	Res, 90.9K, 1%, 1/8W
R5,R6A-R6H, R18,R19,R22	RCRO7GF103J	81349	Res, 10K, 5%, 1/4W
R7A-R7H	RN60C1000F	81349	Res, 100 ohms, 1%, 1/8W
R8A-R8H	RN60C1242F	81349	Res, 12.4K, 1%, 1/8W
R9A-R9H, R11A-R11H	104701-G1	23207	Res, Var, 2K, 10%, 1/2W
R10A-R10H, R12A-R12H	RN60C4322F	81349	Res, 43.2K, 1%, 1/8W
R13A-R13H, R14A-R14H, R20	RN60C1004F	81349	Res, 1 Meg, 1%, 1/8W
R15A-R15H, R16A-R16H	RN60C4422F	81349	Res, 44.2K, 1%, 1/8W

REPLACEABLE PARTS LIST (CONT'D)

626-PA-6011

PC BOARD, 8 CHANNEL INPUT P/N 110280-G3

REFERENCE DESIGNATION	PART NO.	MAN. CODE NO.	DESCRIPTION
R17A-R17H	RN55C2553F	81349	Res, 255K, 1%, 1/10W
R21	RCRO7GF512J	81349	Res, 5.1K, 5%, 1/4W
U2-U4,U11	104216-G3	23207	IC, Hex Tristate Buffer
U5,U6,U25	104202-G3	23207	IC, Quad D Latch
U7,U8	104205-G2	23207	IC, Quad 2-Input Exclusive-OR Gate
U9	104205-G3	23207	IC, 8-Input NOR Gate
U10	104204-G2	23207	IC, Quad 2-Input OR Gate
U12	104201-G1	23207	IC, Dual D Flip-Flop
U13,U14	104316	23207	IC, Bounce Eliminator
U15	See Program Listing 105909	23207	IC, PROM
U16,U17	104331	23207	IC, Hex Buffer
U18	104203-G2	23207	IC, Hex Inverter Buffer
U19	104220-G4	23207	IC, Quad 2-Input OR Gate
U20	104216-G6	23207	IC, Dual Multivibrator
U21	104217-G5	23207	IC, Decoder/Demultiplexer
U22	104217-G2	23207	IC, Dual Binary Counter
U26	104204-G1	23207	IC, Quad Switch
U27,U29A- U29H	104236-G2	23207	IC, Dual Input Op-Amp
U30-U33	104362	23207	IC, Quad Switch
XU15	104933	23207	IC Socket, 24 Pin

SECTION VI

SCHEMATIC DIAGRAMS AND ASSEMBLY DRAWINGS

This section contains the schematic diagram and assembly drawing for the 6011 plug-in. The schematic diagram (fig. 6-2) supplements the Theory of Operation section; the assembly drawing (fig. 6-1) illustrates and locates the parts referenced in the Replaceable Parts List of this manual.

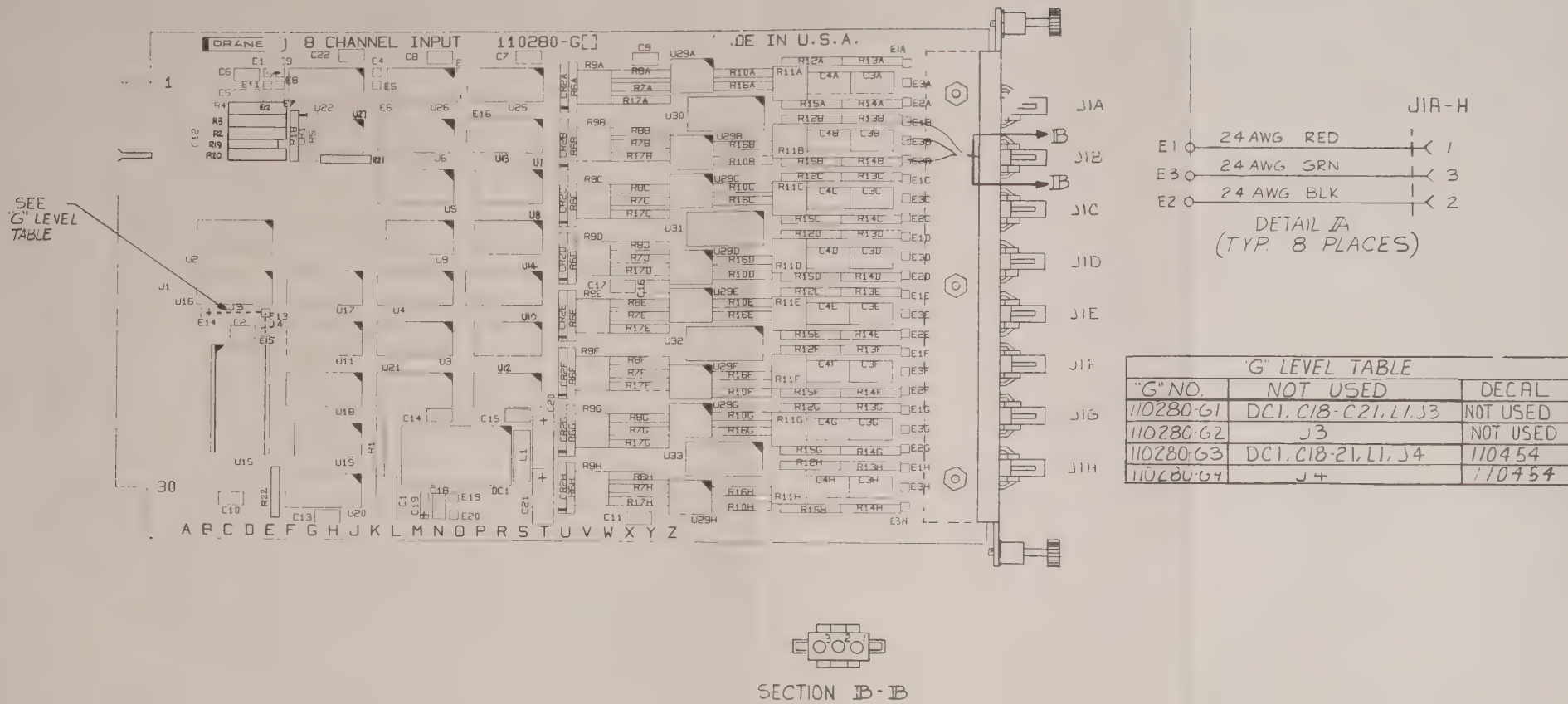


Figure 6-1. 6011 Time and Event Accumulator,
Assembly Drawing 110280-G3, Rev. E

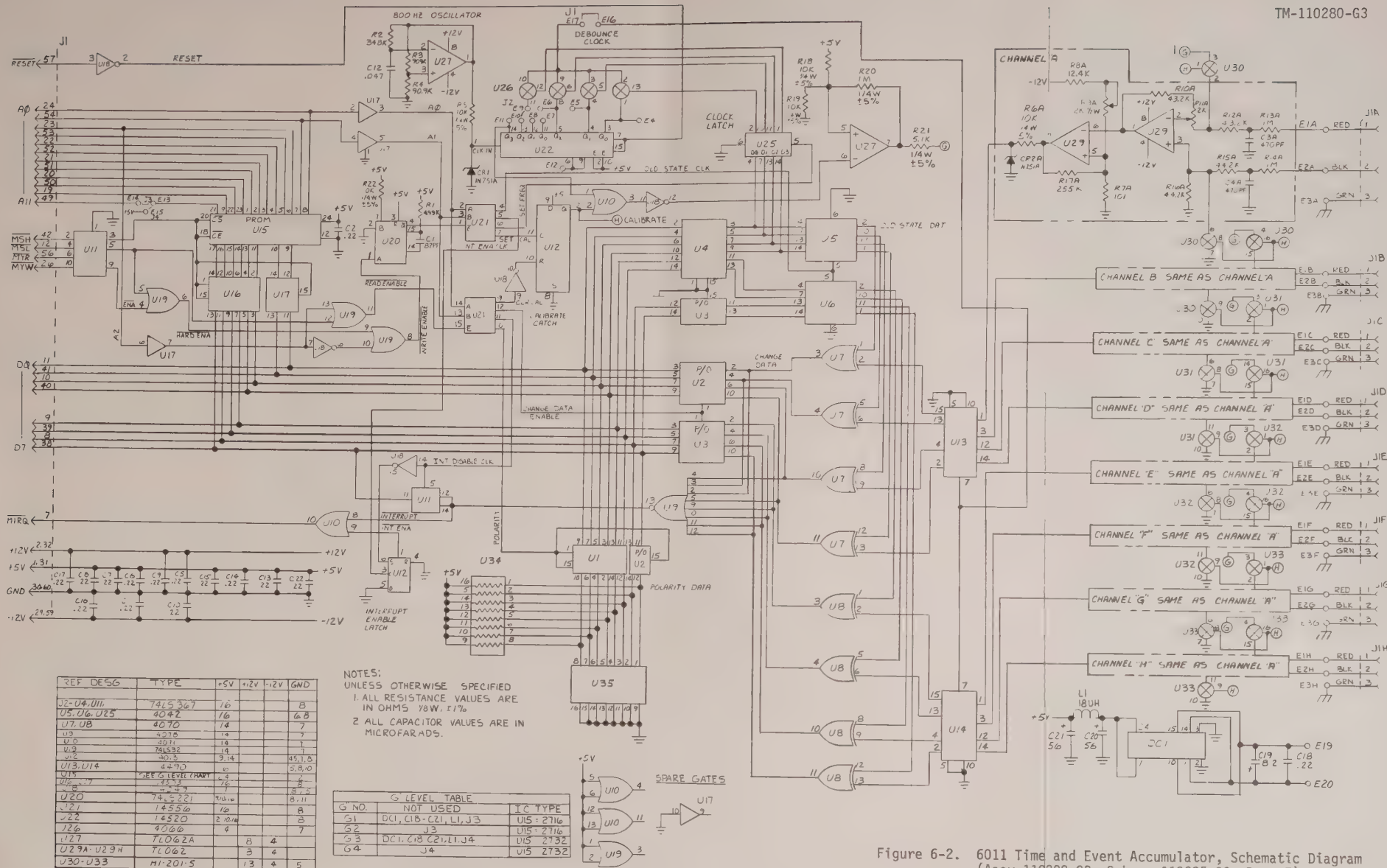


Figure 6-2. 6011 Time and Event Accumulator, Schematic Diagram (Assy 110280-G3; Schem. 110285-G3, Rev. E)

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SOUTH PLAINFIELD, NJ 07080

TEL. (201) 755-7081

TWX: (710) 997-9553
TELEX: 499-7808
CABLE: DRANETZ

REPAIR/SERVICE ORDER

NOTE: THIS COMPLETED FORM MUST ACCOMPANY RETURNED EQUIPMENT

CUSTOMER SHIPPING & BILLING INFORMATION

CUSTOMER P.O. # _____ P.O. DATE _____
SHIP TO: _____ INVOICE TO: _____

In Continental U.S., material will be returned by Dranetz to you by UPS, UPS Blue or other carrier chosen by Dranetz unless otherwise designated.

EQUIPMENT BEING RETURNED

Date of Original Purchase: _____ Original P.O. # _____
Model No. _____ S/N _____
Model No. _____ S/N _____

Ancillary equipment also being returned (If you neglect this, these items may not be returned to you).

☐ Power & Other Cables _____ ☐ Instr. Book _____
☐ Plug-ins (incl. S/N) _____ ☐ Connectors _____
☐ Other _____

RETURN AUTHORIZATION

Have you discussed the problem with Dranetz Sales or Service personnel? _____ Dranetz Return Authorization # _____
By: _____

If so, with whom _____ Date: _____
Whom should the Dranetz Service Corporation contact for technical questions? _____

NAME (Print)

DEPARTMENT

TELEPHONE

DESCRIPTION OF PROBLEM

Reason for return: Defective ☐ Calibration ☐

Please be detailed, explicit and complete. Include test data, if this helps to describe the problem.

IMPORTANT: Repairs cannot be made unless this section is completely filled out.

(Attach added sheets if necessary)

CHECK WHERE APPLICABLE: IS MALFUNCTION RELATED TO: Warmup ☐ Temperature ☐
Intermittency ☐ Mechanical Handling ☐ Visual Defects ☐ Grounding ☐ Test Data Attached ☐

INITIATOR OF THIS ORDER

NAME/TITLE

SIGNATURE

TELEPHONE

(SEE OTHER SIDE FOR INSTRUCTIONS)

IMPORTANT (SEE OTHER SIDE FOR INSTRUCTIONS)

IMPORTANT (ENCLOSE THIS ENTIRE FORM WITH EQUIPMENT)

INSTRUCTION FOR REPAIR ORDER — DRANETZ SERVICE CORPORATION
Subsidiary of Dranetz Technologies, Inc.

IMPORTANT: FOLLOW INSTRUCTIONS & USE THIS FORM. IT IS DESIGNED TO HELP US HELP YOU.

1. **Before** returning equipment to our factory, call our Service Corporation **Tel: (201) 755-7081**
Give the model No., serial number, and information on the problem.
 - A. Our specialists may be able to solve your problem rapidly without equipment return.
 - B. If equipment return is needed, you will be supplied with appropriate instructions and authorization information to expedite service.
2. If return is to be made,
 - A. Fill out the other side of this form **COMPLETELY**.
 - B. Enclose original of form **INSIDE** the shipping carton, preferably attached by masking tape to the equipment.
 - C. Ship prepaid (including insurance); we will return prepaid unless otherwise advised by you.
 - D. **IMPORTANT - PACK PROPERLY! SHIPPING DAMAGE WILL BE CHARGED TO YOU!**

NOTE: NEW EQUIPMENT

Statement of Warranty - All products of Dranetz Technologies, Inc. are warranted to the original purchaser against defective material and workmanship for a period of one year from the date of delivery. Dranetz will repair or replace, at its option, all defective equipment returned, freight prepaid, during the warranty period, without charge for repair, provided there is no evidence that the equipment has been mishandled or abused.

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